

CLIMATIC AND RACIAL FACTORS IN VASOMOTOR RHINITIS*

J. F. JARVIS, *Department of Anatomy, University of Cape Town, and Department of Otolaryngology,
Groote Schuur Hospital, Cape Town*

My interest in this aspect of vasomotor rhinitis began while I was in practice for over 20 years in East Africa, part of the time in the humid coastal climate of Dar-es-

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Salaam and Mombasa, and later in the dry, high-altitude climate of Nairobi. While very conscious that my case histories lack much in the way of detailed pathological investigations, the facilities for which were often not available, I hope there may be some value in putting on

record the clinical impressions that began to build up after a few years of experience in this tropical climate.

A considerable proportion of my patients were Europeans and Asians who had been recruited from their home countries for periods of service with Government or commerce and who returned there for leave after a period of work in East Africa. Many of these presented themselves with symptoms of vasomotor rhinitis and very frequently gave the story that they had not suffered from this in their native land, but that it had developed after a period in East Africa which varied from a few months to 5 years. Moreover, the great majority stated that these symptoms disappeared when they went on home leave, only to recur when they resumed duty in East Africa. In the case of the Indians, it did not seem to matter very much whether they spent their leave in the dry interior of India, or at the coast at a place such as Bombay—in each case they were free from trouble.

Another fact that emerged was that many of the patients who developed the trouble at the coast found relief if they went to the dry interior, while at the same time others who first had symptoms inland, were relieved at the coast. It thus appeared that there were three distinct groups of patients—those who had suffered from vasomotor rhinitis before coming to East Africa, and who continued to suffer to a lesser or greater degree there, these forming the minority of the cases I saw; those who developed the trouble at the coast and were usually better up-country; and finally those who developed the disease in the dry climate of the highlands, and benefited when at the coast.

The coastal type of disease was usually aggravated in the short, cool season, when, during June, July and August, the climate is less humid and not so hot. Patients frequently reported that drinking iced drinks, getting cool draughts on various parts of the body, or rising out of a warm bed into colder air at night, precipitated the symptoms.

RACIAL DIFFERENCES

When I began to prepare this paper, I referred to the case histories of patients I had treated in East Africa, in an attempt to compare the frequency of this disease in the two types of climate. It soon became clear that not only climate, but race also, had an influence on the incidence, and so I feel I must include this aspect in the figures I have extracted. Accordingly, I have taken random samples of all patients attending an ENT clinic, consisting of 1,000 each of Asians from the coast, Asians from the interior, and Europeans from the interior. For the coastal Europeans I have only 500 case histories available. The records of my African patients are not accessible, since they were almost all seen at one of the Government hospitals, but I did gain some definite impressions about the disease in the African that I shall mention later. The diagnosis of 'vasomotor rhinitis' has been chosen rather than that of 'nasal allergy', because the latter term commits one to an aetiology that I believe is not always the true cause of these symptoms. It will be seen from Table I that this diagnosis was made in 12% of Nairobi Europeans,

TABLE I. INCIDENCE OF VASOMOTOR RHINITIS AMONG UNSELECTED PATIENTS ATTENDING ENT CLINICS

	Asians		Europeans	
	Coast (1,000)	Inland (1,000)	Coast (500)	Inland (1,000)
Males	18	16	5	6
Females	11	11	4	6
Total	29	27	9	12

9% of coast Europeans, 27% of Nairobi Asians, and 29% of coast Asians, all unselected patients attending ENT clinics.

Africans do not suffer from this condition (or at least, do not present themselves for treatment) as often as the other two races, but the few who did so had a severe form of the disease which was not easy to relieve. I believe one reason for the low incidence of symptoms in the African may be his wide nasal cavity. A moderate degree of swelling of his mucosa, such as would cause severe obstruction in a narrower nose, does not cause difficulty to him. When he does complain of symptoms, the usual finding is a gross enlargement of the inferior turbinals.

Nasal Indices

We may at this stage note that anthropologists have for a long time included the nasal index among the measurements they record, and it can be determined either in the living subject or on the dry skull. For clinical purposes, that in the living is most useful and can be defined as the percentage ratio of greatest breadth at the alae to the nasal height measured from the nasion to the point where the septum and upper lip join. Nasal indices from all over the world were collected by various workers, including Leys and Joyce,¹ Thomson and Buxton,² and Davis.³

The European nose is described as leptorrhine and has an index up to 70, the Asian nose is mesorrhine with an index from 70 to 81, and the Bantu nose is platyrrhine, with a value of 85 to 100 or more. Moreover, Thomson and Buxton² and Davis³ correlated nasal index with climate and showed that the inhabitants of hot areas tend to the platyrrhine form, and of cold areas to the leptorrhine. They also showed that the physiological demands made on the nose in the various climatic environments were in fact reflected in the type of nose most commonly found there. Their thesis is that there is evidence that races who live in a particular climate for a long time have noses which have gradually adapted their form to that which is most suitable for the climate in question, and that immigrant groups will slowly change over thousands of years in the direction of the type that is ideal for their new home. Figures they quote for England from Neolithic times onward support their claim. If their thesis is true, then it follows that when an individual comes to reside in the tropics from a different home climate, his nose may not be ideally suited to his new conditions.

AETIOLOGY

The interest in examining the incidence of vasomotor rhinitis under various climatic conditions and in different racial groups is that such a study may throw some light

on the causation of this very prevalent disability. I should like, therefore, to put three possibilities forward for consideration and further investigation.

Psychological Factors

Firstly, the main factor may be psychological; residence in a rather trying climate being responsible for the disorder, and the enjoyment of a well-earned vacation alleviating the symptoms when the subject returns to his homeland. The difference between the Europeans and Asians could also support the same explanation, since the Asians appear to show a generally greater tendency to psychosomatic disorders.

In a stimulating contribution to the *Journal of Laryngology*, Wilson⁴ suggested that the majority of the sufferers from vasomotor rhinitis are of the vagotonic type, owing to lack of sufficient emotional or environmental stimulation. The enervating tropical climate would appear to be just such a causative environment. Other workers have also considered that psychological causes play a part in the development of this condition. Wolff⁵ described some patients with psychological disorders as 'nose reactors', and demonstrated in one patient that nasal biopsy performed when the subject was free from mental strain showed a normal mucosa, but the same individual in a phase of stress showed eosinophilia in the mucosa and also in the circulating blood.

Allergy

The next possibility is that these patients are exposed to some particular allergen not encountered to the same extent in their land of origin. While working at the coast I had no facilities for accurate allergy investigations, but when later at Nairobi I did have the assistance of an enthusiastic allergist in Dr. A. Henderson-Begg, the results of skin tests he undertook most carefully were often inconclusive. While in England in 1952 I discussed this problem with Dr. Kate Maunsell and she suggested that moulds might be responsible, but I was unable to follow this line of investigation further at that time.

Ordman⁶ found that house dust from Durban contains a much more potent allergen than that from dry localities, and suggested that in the humid climate decomposition of some constituent of the dust by bacteria or moulds might explain its activity. He showed that many more patients exhibited sensitivity to the extracts of coast house dust than to that prepared from inland sources, but he did not indicate if the patients he tested lived habitually at the coast or inland. He also made the interesting observation that in deep mines on the Rand the temperature and humidity are comparable to those at the coast, and yet the miners do not show the allergic sensitivity that is found in subjects at the coast. In support of the allergic basis may be the observation made by some of my patients that they began to experience relief as soon as they sailed from East Africa.

Physical Allergy

The third suggestion is that the symptoms are a direct result of the climate — a concept that has sometimes been called a 'physical allergy'. As we know, the nasal mucosa has the important function of warming and humidifying

the inspired air. In an average climate the amount of water evaporated from the nose in 24 hours has been estimated to be from 430 to more than 1,000 G.^{7,8} Some of this is recovered on expiration by condensation on the mucosa cooled by the previous inspiration. To achieve this high evaporation the nose has a rich blood supply, the flow of which is under the control of the autonomic nervous system.

It has been shown that cold applied to other parts of the body produces a vasoconstriction that shrinks the mucosa, and that this effect is mediated through the sympathetic nervous system. Drettner,⁹ in describing this, also stated that a biphasic reaction is often present, the initial constriction being followed by a dilatation even when the stimulus is still being applied. The direct effect of inspiring cold air is, however, to produce a congestion of the nose. Fowler¹⁰ reported a case in which a patient was subjected to a stellate ganglionectomy for a causalgia in the arm, and after operation developed typical vasomotor rhinitis, including eosinophilia in the nasal secretion, limited to the same side of the nose. Heetderks¹¹ and Stoksted¹² have described another interesting nasal mechanism present in many people. Here one nostril is the more patent for a period of about 2½ hours; then this closes partly and the opposite side opens for a similar period. It was only recently that I came across the work of these two investigators, but in 1939 I was interested in the same phenomenon when I heard that the yogi taught a similar thing; I tried it out on myself and found it true when I was living in East Africa. Here in the Cape I find the effect much less pronounced, but difference in age may also be a factor. All these considerations make it clear that the degree of vascular engorgement of the nasal mucosa is constantly changing under nervous control, and it would not be surprising if the mechanism sometimes developed aberrations.

When a subject is living under conditions of high temperature and humidity, his nasal mucosa may have little or no work to perform, and it is not unreasonable to suppose that after a time this disuse may lead to a breakdown of the normal vasomotor mechanism, especially when a sudden call is made upon it by the stimulus of cold. This is in harmony with Wilson's concept of a vagotonia; Golding-Wood¹³ also stated that in vasomotor rhinitis the parasympathetic is acting more strongly than the sympathetic. He makes this the rationale of the operation of vidian-nerve section, since both sympathetic and parasympathetic are destroyed if this nerve is cut. Thus we may explain the frequent complaint that the symptoms are aggravated by sudden cold either by a disuse atony of the sympathetic, or by a predominance of the second phase of the normal biphasic reaction to cold. It would seem that Ordman's observation of the conditions in mines would support the physical allergy suggestion rather than a reaction to an inhaled allergen, since one would have expected such allergens to be in the dust in the mine as well as at the coast. But if we accept that prolonged and continuous exposure to high temperature and humidity may produce a physical allergy, the miners' freedom from this condition can be explained satisfactorily by the fact that they are only so exposed during working hours and have periods out of these conditions between shifts to readjust.

Marked Temperature Changes

It will have been noticed that the figures I have extracted from my records show that this disorder is quite as prevalent in the dry interior as it is at the East African coast, and clearly we must postulate a slightly different mechanism for the cases developing in a dry climate. At a place such as Nairobi, the diurnal temperature range is greater than at most places in temperate regions, and the annual range is almost as wide. The humidity is very low in the dry season, but almost as high as at the coast during rainy periods. It may well be that a nose that is designed to operate over a range of temperature and humidity found in other lands, may not be able to adjust to the greater and different range found in the tropical hinterland. Again, in time it may break down—not from disuse, but from the excessive demands made upon it. The observation that both the coast and the inland types of the disorder are helped by a change to the other climate would seem to support this.

DISCUSSION

Some of the possible aetiological factors in vasomotor rhinitis have been discussed, and I believe that the suggestion that it is, in part at least, a direct effect of the climate is worthy of further investigation. It is not possible here to give full consideration to the part that endocrine activity plays in this disorder, but this aspect has been underlined by other workers. Recently Taylor^{14,15} noted that the volume of cavernous tissue in the nasal mucosa is related to sex-hormone concentration and is greatest at the periods of life when sex activity is greatest.

The age incidence in the cases studied is analysed and

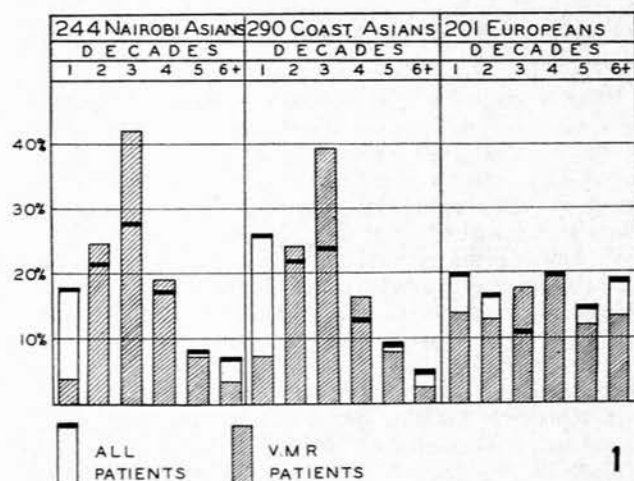


Fig. 1. Age incidence in patients with vasomotor rhinitis and in all ENT patients.

set out in Fig. 1. Males and females were originally calculated separately, but since no marked difference between the sexes was apparent they have been combined here. A similar analysis of all ENT cases has been made and included for comparison. The percentage distribution shown, with the peak in the third decade (especially seen in the Asians), supports Taylor's concept. I feel that it is possible that the greater incidence of the disease in certain

ages, as well as the age peak, may be related to the degree that sex enters into the thoughts and activities of many of their members.

The age-distribution histograms in the case of the Europeans probably need some correction to allow for the fact that many children leave East Africa in their late 'teens' for training overseas, and do not return until well on in the third decade. But even if it were possible to make an accurate estimate of this factor, I do not think the

TABLE II. ANALYSIS OF CONDITIONS ASSOCIATED WITH VASOMOTOR RHINITIS

Condition	Asians				Europeans	
	Inland		Coast		Inland	
	M (145)*	F (105)	M (183)	F (107)	M (57)	F (62)
Deflected septum ..	37	31	27	19	11	18
Headache ..	34	56	23	27	18	18
Inferior-turbinate enlargement ..	46	48	36	39	26	27
Middle-turbinate enlargement ..	6	8	2	3	2	3
Polypi (including antral polypi) ..	10	10	5	2	12	3
Asthma ..	25	22	16	10	4	6
Sinus infection ..	16	7	5	7	7	8

* Figures in brackets denote total patients in each group.

third-decade peak would be nearly as striking as it is in the case of the Asian. Possibly the higher incidence of inferior-turbinate hypertrophy may also be related to similar considerations.

In the analysis of associated conditions, set out in Table II, the low incidence of polypi and of coexistent sinus infection is of interest. Asthma, which included all patients with asthma-like symptoms, is more common again in the Asian, but the dust-free coastal climate seems to offer some relief from this disorder.

SUMMARY

A series of 3,500 patients seen at an ENT clinic in East Africa was studied, and the incidence of vasomotor rhinitis determined. Cases of this disorder are analysed in relation to race, climate, age, and associated conditions. Possible causative factors are discussed, and the suggestion is put forward that the tropical climate itself may be responsible for the development of abnormal reactions in the nasal mucosa which might be designated as physical allergy.

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